Postgraduate Seminar Series

Venue: Graduate Seminar Room
Date & Time: November 08, 2025 at 2:30 PM

Speaker Information

Mursheda Tasnim (Std No. 0422052031) is a full time M.Sc. student in the department of CSE, BUET. She completed her undergraduate studies from BUET in 2022. Her research interest lies in the fields of Spatial Databases, Ubiquitous Computing, and Algorithms. She is currently doing her postgraduate thesis under the supervision of Dr. Tanzima Hashem. She will be speaking about her ongoing research in this talk.

An Efficient Algorithm for Fair Nearby Neighbor Queries

Map-based services, such as those used for finding nearby hospitals, restaurants, or other facilities, often rely on nearest neighbor queries to connect users with their closest points of interest (POIs). However, traditional NN-based approaches often overlook fairness and capacity constraints, which can cause multiple users to be directed to the same POI. During high-demand situations, such as hospital emergencies or public health outbreaks, many POIs operate under strict capacity limits. As a result, some users may be unable to access services upon arrival, leading to unnecessary delays or the need to travel farther to alternative POIs. To address this issue, this thesis introduces a novel query type, the Fair Nearby Neighbor (FaNN) query, which assigns POIs to users while minimizing the maximum user–POI distance and ensuring that no POI exceeds its capacity limit. We propose an efficient algorithm, FaNN-EA, to process FaNN queries without exhaustively retrieving all POIs or evaluating all possible assignment combinations. The algorithm leverages distance-based properties to intelligently guide the search process and eliminate infeasible or suboptimal assignments. By exploiting these spatial relationships, the algorithm can efficiently narrow down the search space and terminate early once the optimal solution is guaranteed. To further enhance computational efficiency, we introduce two optimized variants: FaNN-EA-B, which uses incremental batch processing to retrieve and process POIs in manageable groups, and FaNN-EA-R, which avoids redundant computations through the reuse of intermediate results. A hybrid algorithm, FaNN-EA*, integrates both strategies to achieve superior scalability and real-time performance while preserving optimality. Our comprehensive experiments using real-world datasets, demonstrate that our proposed algorithms can process FaNN queries in real time and significantly outperform baseline method.